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**TOCKWITH ENERGY FROM WASTE FACILITY  
ACCIDENT AND EMERGENCY RISK ASSESSMENT**

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**Project Quality Assurance Information Sheet**

**Accident and Emergency Risk Assessment  
BCB Environmental Management Ltd**

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ACCIDENT AND EMERGENCY RISK ASSESSMENT  
TOCKWITH EFW FACILITY**

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## Accident and Emergency Risk Assessment

### Introduction

- 1.1 The aim of the plan is to provide a system for preventing accidents from occurring and to ensure measures are in place for mitigating any potential environmental impacts. The report outlines the accidents and emergencies which have the potential to arise during the operation of the proposed energy from waste facility. An assessment has been made of the risks associated with the operation of the facility and the measures taken to reduce and manage that risk.
- 1.2 The Plan has been prepared with reference to the Environmental Agency, Scottish Environment Protection Agency and Northern Ireland Environment and Heritage Service Sector Guidance Note IPPC S5.01 – ‘Guidance for the Incineration of Waste and Fuel Manufactured from or Including Waste’.
- 1.3 The risk assessment addresses the three criteria detailed under Section 2.8 of the Sector Guidance Note S5.01 as follows:
  - Identification of the hazards posed by the installation;
  - Assessment of the risks of accidents and their possible consequences; and
  - Description of techniques to reduce the risk of accidents and contingency plans for instances where accidents occur.
- 1.4 A detailed (Hazard and Operability Analysis) HAZOP study for the installation will be undertaken as part of the submission documentation for the Environmental Permit (EP) application. In addition an accident management plan will be developed for the installation during the first year of operation. The findings of the HAZOP study and the requirements of the EP will be fully considered in development of the accident management plan. The accident management plan will be regularly reviewed. Incidents and near misses will be recorded and investigated, and remedial and preventative measures will be undertaken in accordance with the accident management plan and the Environmental Management System (EMS).

### Identification of Hazards

- 1.5 A number of environmental hazards have been identified in relation to the operation of energy from waste facility, including storage and handling of raw materials and waste, equipment failure, fire, flooding, and vandalism. These are considered individually in Table 1.

**Table 1 Hazards Associated with the Operation of the Plant**

Hazard	Description
Spillages	Raw materials stored onsite will consist of waste for processing and non waste raw materials associated with maintenance and operation of the plant. Raw materials required for process operation will include; sodium bicarbonate, activated carbon, urea powder, water treatment chemicals, gas oil, hydraulic oils and sawdust. Spillages have the potential to occur during the handling and storage of raw materials.
Undesired reactions	Chemicals transferred into the wrong tank may result in undesired reactions including leaking of hot/toxic/flammable gas from process ducting, explosions and fire.
Containment failure	Failure of containment structures could result in large volume losses of bulk storage chemicals to the site drainage system.
Fire	A significant fire hazard is also posed by the bulk storage of waste and raw materials. As well as the direct threat to human health of burns and asphyxiation, this hazard poses a variety of threats to the local environment including i) emissions to air of oxides of nitrogen (NOX), sulphur dioxide (SO2) and carbon monoxide (CO), potentially impacting on human health and sensitive ecological receptors, ii) destruction of habitats and iii) deposition of ash to surface water and land, potentially resulting in smothering, iii) large volume of contaminated fire water to be disposed of.
Explosion	An explosion is a sudden increase in volume and release of energy in an extreme manner, usually with the generation of high temperatures and the release of gases. Explosions may result from the storage of incompatible waste or high temperature environments.
Flooding	Although no flooding events have been recorded at the installation, the risk of flooding remains. Under extreme conditions (e.g. failure of local flood defences, large volumes of storm water run-off or fire water run-off) flooding could pose a significant threat to the site. The Environment Agency indicative flood maps show that the site is located 500m from an area that has a moderate chance of flooding. The chance of flooding each year is 1.3% (1 in 75) or less, but greater than 0.5% (1 in 200). This takes into account the effect of any flood defences that may be in this area.
Loss of power	Loss of power would result in the inability to operate the plant. This would cause the incoming waste stream to be stored for longer periods, potentially resulting in foul odours being created.
Vandalism	Vandalism could result in damage to the infrastructure used to contain potentially polluting substances such as chemicals. Fire (arson) could also result from vandalism.
Drainage system	Blocked or cracked drainage systems can result in losses of effluent and site drainage to land and groundwater. Potential contamination may result.

<p>Emergency emissions via the by-pass stack resulting from:</p> <ol style="list-style-type: none"><li>1. ID fan breakdown;</li><li>2. Thermocouple failure in the secondary combustion chamber;</li><li>3. Failure of boiler heat recovery system; and</li><li>4. Pressure build up in secondary combustion chamber</li></ol>	<p>Breakdown will lead to emergency emission via by-pass stack. Under abnormal or emergency conditions the facility control system may automatically initiate discharge of exhaust gas from the secondary chamber from the by-pass stack. The auxiliary burners in the secondary combustion chamber will be activated during by-pass conditions to limit contaminant emissions.</p> <p>Emergency venting may continue for a maximum period of four hours as per Waste Incineration Directive. Emergency venting would result in unabated releases of SO<sub>2</sub> and HCl to atmosphere. A full atmospheric dispersion model has been conducted and supplied with the Planning Application.</p>
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## Methodology for Risk Assessment

- 1.6 The scoring methodology employed in the H1 Guidance is used as a framework for assessing the risk from various accident scenarios identified. The scoring system attributes a nominal score to the likelihood and consequence of an identified scenario, and then uses a matrix to identify whether the risk is acceptable. The scoring system is outlined below:

### Likelihood categories

Category	Description	Score
Extremely unlikely	Incident occurs less than once in a million years	1
Very unlikely	Incident occurs between once per million and once every 10,000 years	2
Unlikely	Incident occurs between once per 10,000 years and once every 100 years	3
Somewhat unlikely	Incident occurs between once per hundred years and once every 10 years	4
Fairly probable	Incident occurs between once per 10 years and once per year	5
Probable	Incident occurs at least once per year	6

### Consequence categories

Category	Description	Score
minor	<ul style="list-style-type: none"> <li>nuisance on site only (no off-site effects)</li> <li>no outside complaint</li> </ul>	1
noticeable	<ul style="list-style-type: none"> <li>noticeable nuisance off-site e.g. discernible odours</li> <li>minor breach of Permitted emission limits, but no environmental harm</li> <li>one or two complaints from the public</li> </ul>	2
significant	<ul style="list-style-type: none"> <li>severe and sustained nuisance, e.g. strong offensive odours or noise disturbance</li> <li>major breach of Permitted emissions limits with possibility of prosecution</li> <li>numerous public complaints</li> </ul>	3
severe	<ul style="list-style-type: none"> <li>hospital treatment required</li> <li>public warning and off-site emergency plan invoked</li> <li>hazardous substance releases into water course with ½ mile effect</li> </ul>	4
major	<ul style="list-style-type: none"> <li>evacuation of local populace</li> <li>temporary disabling and hospitalisation</li> <li>serious toxic effect on beneficial or protected species</li> <li>widespread but not persistent damage to land</li> <li>significant fish kill over 5 mile range</li> </ul>	5
catastrophic	<ul style="list-style-type: none"> <li>major airborne release with serious offsite effects</li> <li>site shutdown</li> <li>serious contamination of groundwater or watercourse with extensive loss of aquatic life</li> </ul>	6

### Risk assessment matrix

Likelihood	Consequence					
	minor	noticeable	significant	severe	major	catastrophic
Extremely unlikely	1	2	3	4	5	6
Very unlikely	2	4	6	8	10	12
Unlikely	3	6	9	12	15	18
Somewhat unlikely	4	8	12	16	20	24
Fairly probable	5	10	15	20	25	30
Probable	6	12	18	24	32	36

**Risk scores**

<b>Magnitude of risk</b>	<b>Score</b>
Acceptable	6 or less
Acceptable if reduced as reasonably practical	8 to 12
Unacceptable	15 or more

**Results**

- 1.7 The identification of the hazards and the risk assessment process is documented in Table 2 below. The hazards identified at the installation are based on preliminary discussions with the operator and process engineers involved in the design of the facility.

Table 2: Accidents and Emergencies Risk Assessment Matrix

Hazard	Likelihood	Score	Consequence	Score	Overall risk score	Acceptability of risk	Justification for acceptability (description of risk management measures)
Minor spillage during delivery of raw materials	Probable	6	Minor	1	6	Acceptable	Procedures for dealing with any leaks and spillages will be developed as part of the site environmental management system. Spill kits will be provided onsite and staff trained in their use. All deliveries will take place on sealed drainage areas capable of containing any potentially polluting materials. All deliveries will be supervised by a site representative.
Major spillage during delivery of raw materials or export of process effluent due to e.g. collision, overfilling of container	Somewhat unlikely	4	Noticeable	2	8	Acceptable if reduced as reasonably practicable	Procedures for traffic management on the installation reducing the likelihood of vehicle collision. All deliveries of raw materials and loading of tankers will take place on sealed drainage areas. All storage tanks will have high level alarms installed to prevent overfilling.
Chemical into wrong tank giving undesired reaction	Somewhat unlikely	4	Significant	3	12	Acceptable if reduced as reasonably practicable	All tanks/storage areas will be clearly labelled. Deliveries and unloading of hazardous chemicals will be undertaken by suitably trained transport operatives and will be supervised from a site representative. Segregation of raw materials will be undertaken in accordance with HSE Guidelines.
Spillage of waste materials during delivery	Probable	6	Minor	1	6	Acceptable	All deliveries of waste will take place within the main building on a sealed drainage area, behind closed doors. Waste may be tracked outside on vehicles leaving the building, but quantities will be minor and dealt with by daily housekeeping procedures.

Hazard	Likelihood	Score	Consequence	Score	Overall risk score	Acceptability of risk	Justification for acceptability (description of risk management measures)
Damage to containment facilities for stored raw materials	Fairly probable	5	Minor	1	5	Acceptable	Bunds and drip trays will be provided for storage of raw materials and will be emptied regularly. Containment facilities will be inspected on a daily basis and repaired as necessary. Storage will be provided on sealed drainage areas; procedures will be in place for cleaning up leaks and spillages.
Fire (waste storage area)	Fairly probable.	5	Noticeable	2	10	Acceptable if reduced as reasonably practicable	Waste storage times will be limited to reduce the likelihood of fires occurring. No H3A (highly flammable) hazardous wastes proposed for acceptance at the facility. Fire fighting procedures will be developed and included in the accident management plan. Locations of fire fighting equipment and type will be agreed with the local Fire Officer upon completion of construction. The installation will be manned during operational hours and staff will be trained in the use of fire fighting equipment. An alarm system will be installed for the identification of onsite fires.
Major fire-process fire or explosion	Unlikely	3	Severe	4	12	Acceptable if reduced as reasonably practicable	Fire fighting procedures will be developed and included in the accident management plan. The process is designed to withstand high temperatures and pressures associated with a combustion activity. Designated storage areas for waste materials to prevent mixing and potential explosion will be provided. Waste acceptance procedures will be employed to ensure explosive wastes are not accepted at the facility.

Hazard	Likelihood	Score	Consequence	Score	Overall risk score	Acceptability of risk	Justification for acceptability (description of risk management measures)
Fire in baghouse	Unlikely	3	Severe	4	12	Acceptable if reduced as reasonably practicable	A control system will be installed to monitor temperature in baghouse in order to prevent fires occurring. Fires will be dealt with as per the accident management plan.
Loss of firewater containment	Unlikely	3	Severe	4	12		Firewater containment will be provided via the onsite drainage system. Procedures for the management of fire water will be developed as part of the accident management plan.
Collision of mobile plant with gasifier	Fairly probable	5	Minor	1	5	Acceptable	The gasifiers are made of welded steel and are robust structures, unlikely to be damaged resulting in a leak by collision. Traffic management and the use of a banksman would reduce the likelihood of collisions occurring.
Flooding	Somewhat unlikely	4	Significant	3	12	Acceptable if reduced as reasonably practicable	There is no anecdotal evidence of flooding in the area of the installation. Sandbags will be available on site to block doors providing further protection.
Leak of hot/toxic/flammable gas from process ducting	Somewhat unlikely	4	Significant	3	12	Acceptable if reduced as reasonably practicable	Gas alarms and safety shut down systems will be installed in the event that a leak of flammable gases occurs. Ongoing maintenance procedures and daily inspections will reduce the likelihood of any emissions occurring. The site environmental management system will ensure that the plant is operated within safety parameters. The site will be operated by competent and trained operatives.
Loss of power	Fairly probable	5	Minor	1	5	Acceptable	The facility will have a supply available as parasitic load from the energy generation plant associated with the site. Backup mains supply is available if facility is not generating electricity. Further emergency diesel generator is available on site with uninterruptable power supply.

Hazard	Likelihood	Score	Consequence	Score	Overall risk score	Acceptability of risk	Justification for acceptability (description of risk management measures)
Vandalism	Somewhat unlikely	4	Noticeable	2	8	Acceptable if reduced as reasonably practicable	The facility will have a security fence installed around the perimeter with monitored access gates. The facility will be manned during operational hours. CCTV security facilities also act as deterrent to unauthorised access to the site.
ID fan breakdown	Somewhat unlikely	4	Noticeable	2	8	Acceptable if reduced as reasonably practicable	Preventative maintenance will be undertaken to reduce the likelihood of fan breakdown. A spare fan will be held on site and replaced immediately when required.
Loss of odour control	Somewhat unlikely	4	Noticeable	2	8	Acceptable if reduced as reasonably practicable	Preventative maintenance will be undertaken to ensure combustion process is maintained. Housekeeping procedures and storage times for waste will be managed to reduce the likelihood of odours arising. Contingency measures will be developed for waste removal in the event of total failure of odour control systems.
Failure of boiler or heat recovery system	Somewhat unlikely	4	Noticeable	2		Acceptable if reduced as reasonably practicable	Preventative maintenance will be undertaken to reduce the likelihood of failure. Daily checks of site infrastructure will be conducted and any repairs completed where necessary.

**Conclusion**

- 1.8 The hazards associated with the operation of the proposed energy from waste facility have been identified in Table 1. The risks associated with the hazards have been qualified and a description of preventative measures, have been outlined in Table 2.
- 1.9 It is clear that the main risks arising from accidents at the proposed development result from spillages of waste and raw materials. Due to the type of waste proposed at the facility, any spillages that are likely to occur will be dry waste from handling of the waste during unloading and loading. Mitigation measures have been established to ensure that spillages do not occur and where accidents do occur, the spillage is dealt with in a safe and timely manner. Spillages which may occur would be within the building and are unlikely to result in any direct impact upon the environment or local populous.
- 1.10 A full accident management plan with specific emergency procedures for fire; explosion etc will be produced as part of the Environmental Permit application.